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The Nutrition Transition

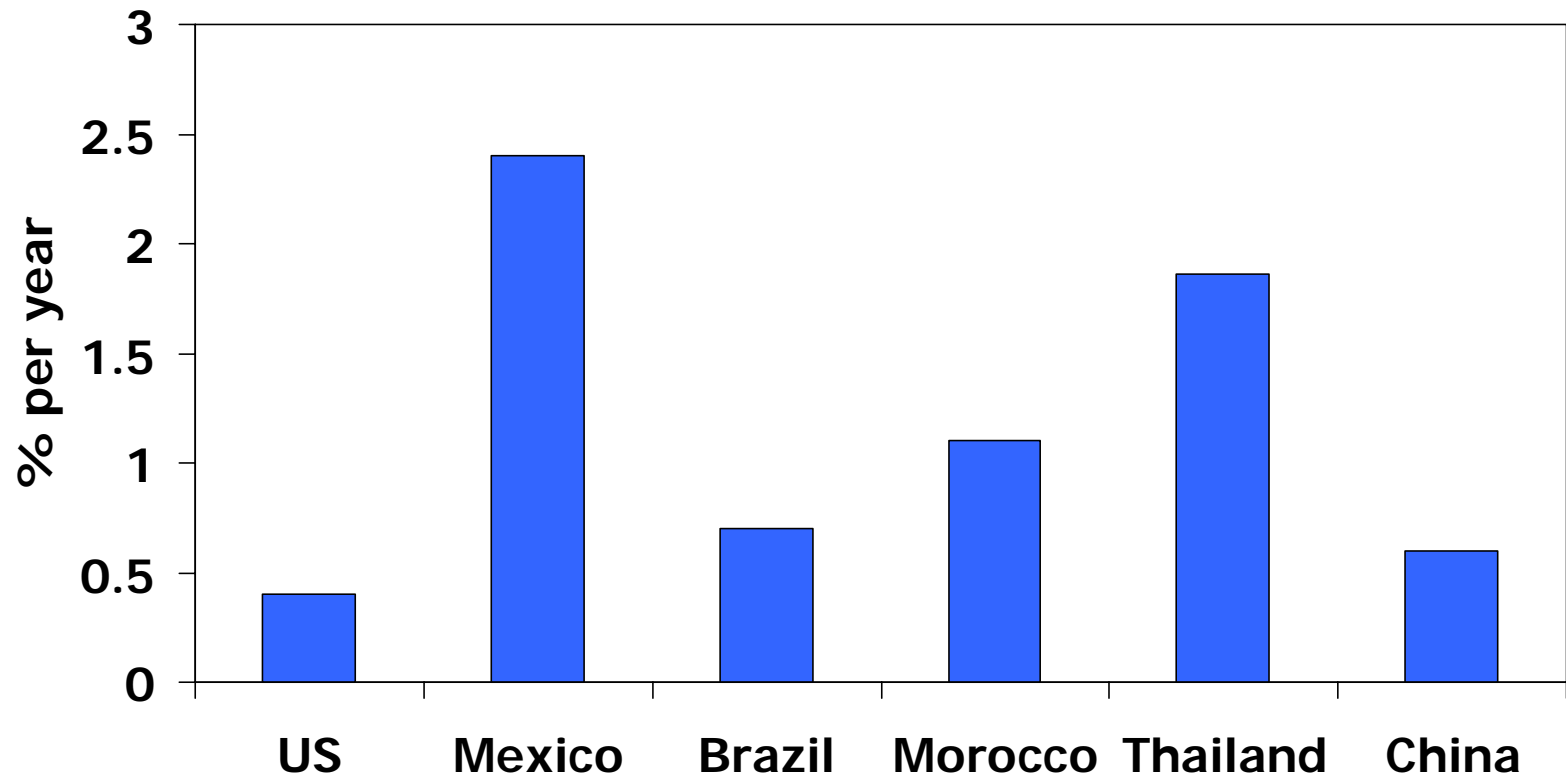
Benjamin Caballero, M.D., Ph.D.

Center for Human Nutrition

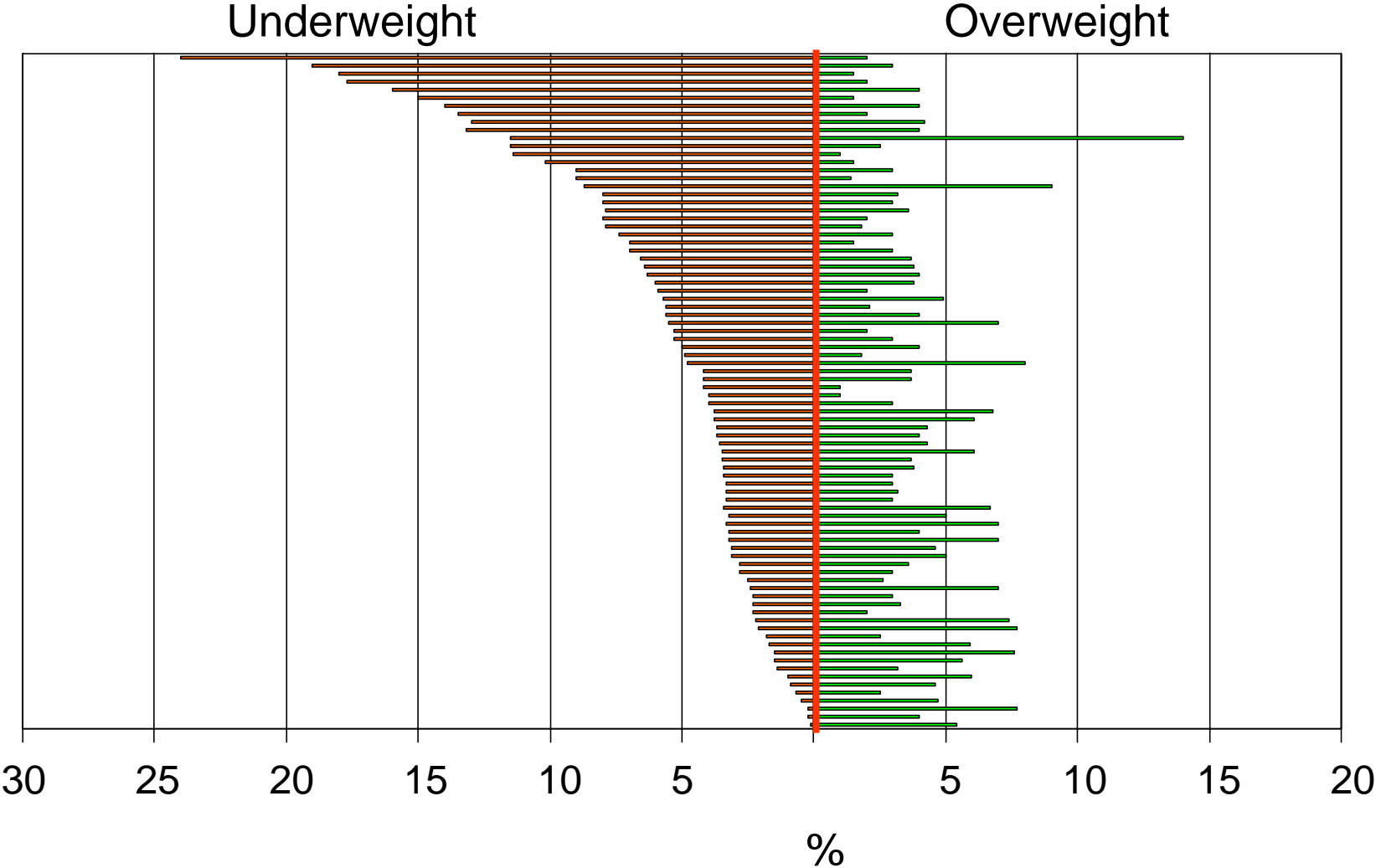
Johns Hopkins Bloomberg School of Public Health



Annual increase in obesity rates in selected countries (women)

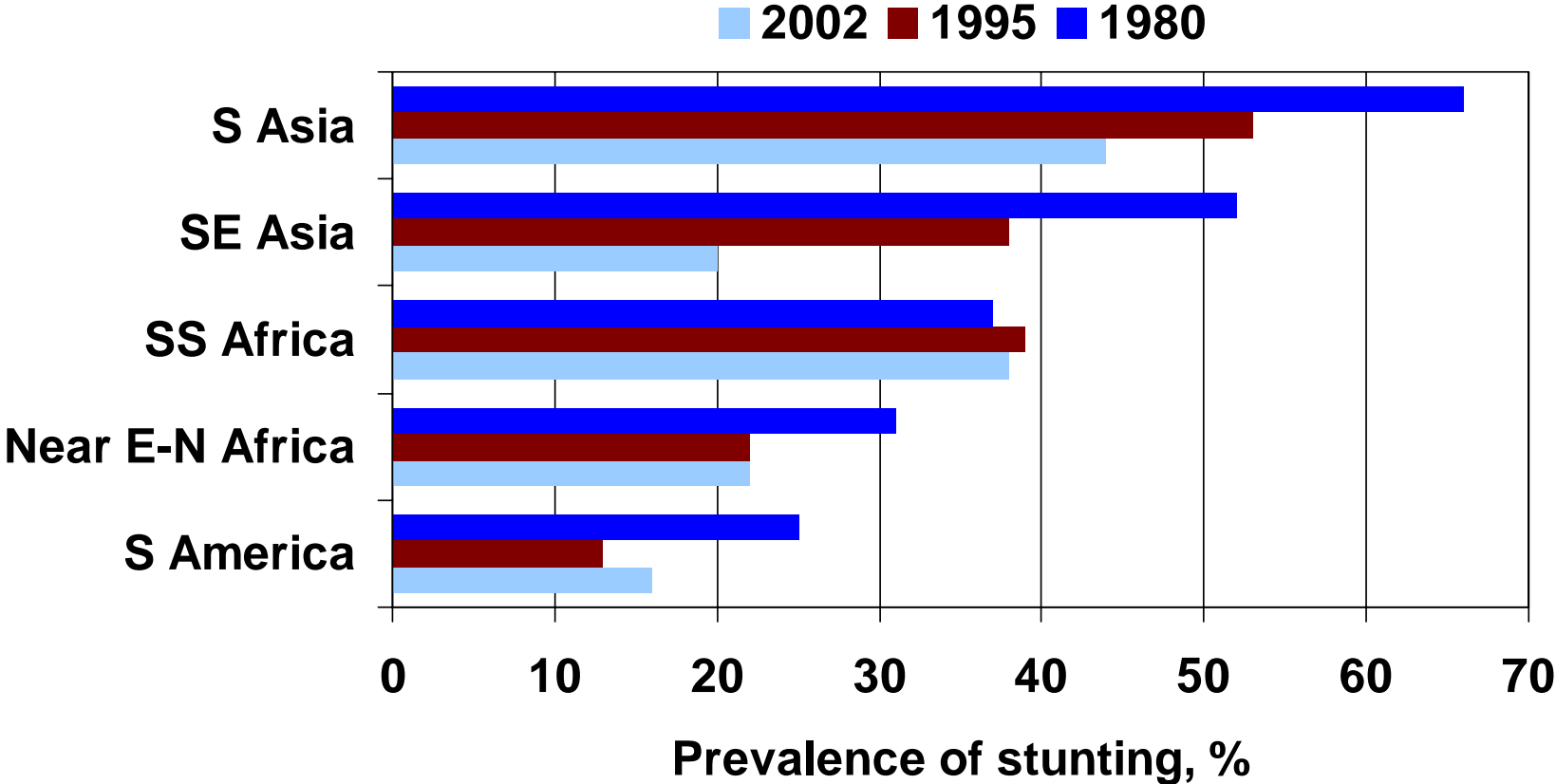


Under- and overweight, 0-5 yr/old children



Is the world shifting from
undernutrition to overnutrition ?

Prevalence of stunting in < 5 yr/old children



World poverty, 1981-2001

% of people living with <US\$2 per day

	1981	1990	2001
South Asia	89.1	85.5	77.2
Sub-Saharan Africa	73.3	75.0	76.6
South E Asia & Oceania	84.8	69.9	47.4
Latin American & Caribbean	26.9	28.4	24.5
North Africa & Middle E	28.9	21.4	23.2
Europe & Central Asia	4.7	4.9	19.7

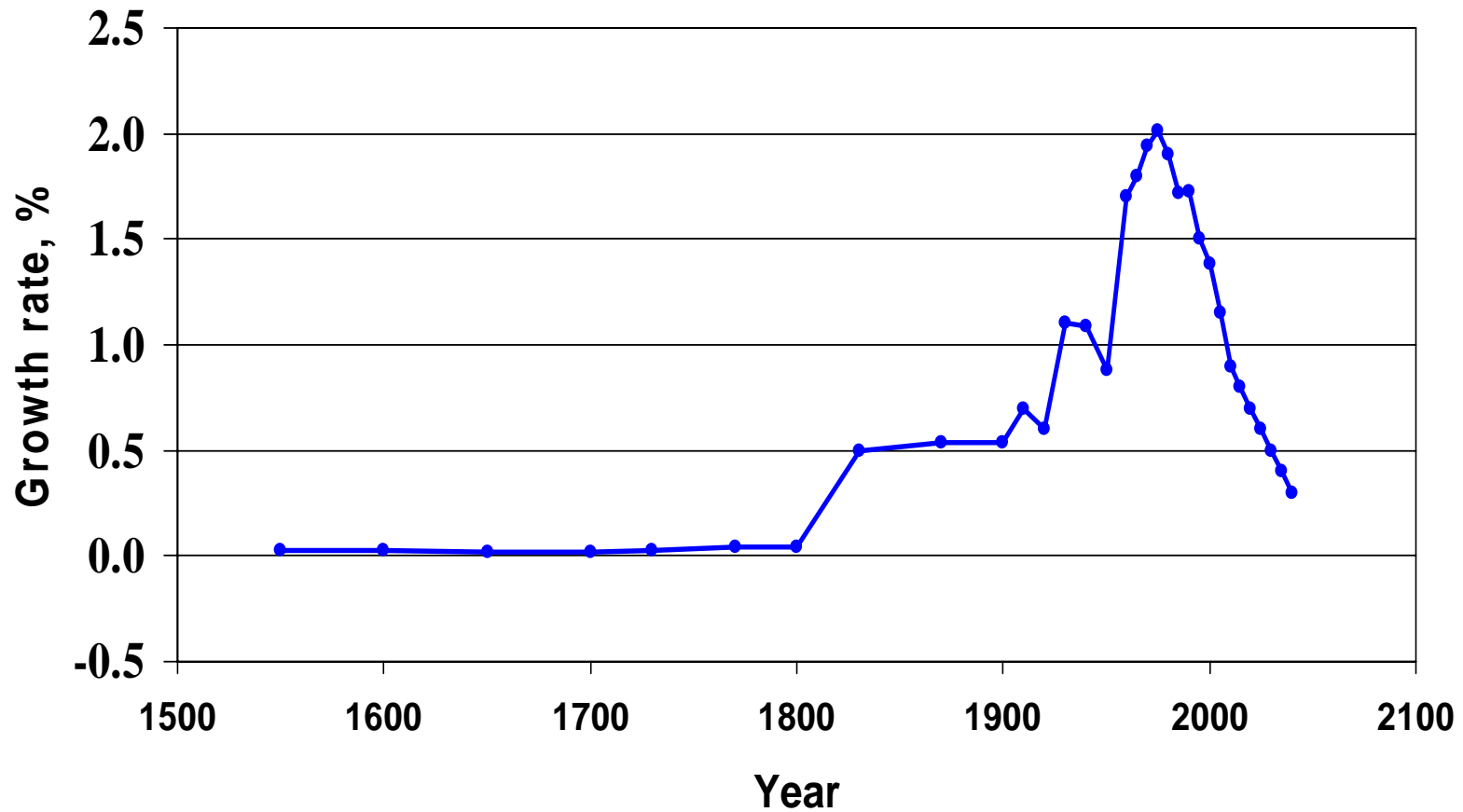
The Nutrition Transition

- ⊕ Demographic trends
- ⊕ Food availability and cost
- ⊕ Lifestyle

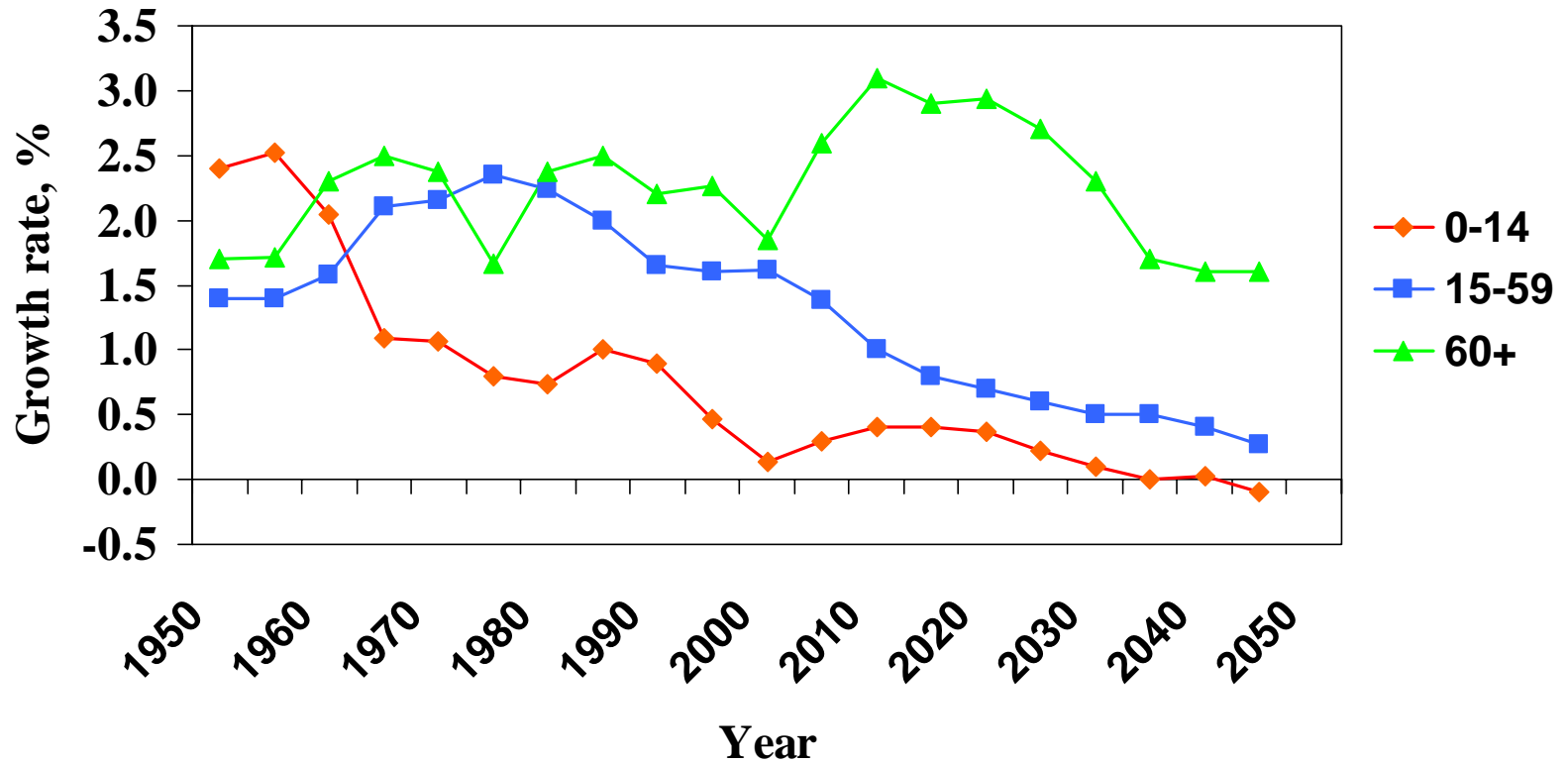
Demographic trends

- Urbanization
- Increase in life expectancy
- Reduction in infant mortality

World population growth, 1500-2100

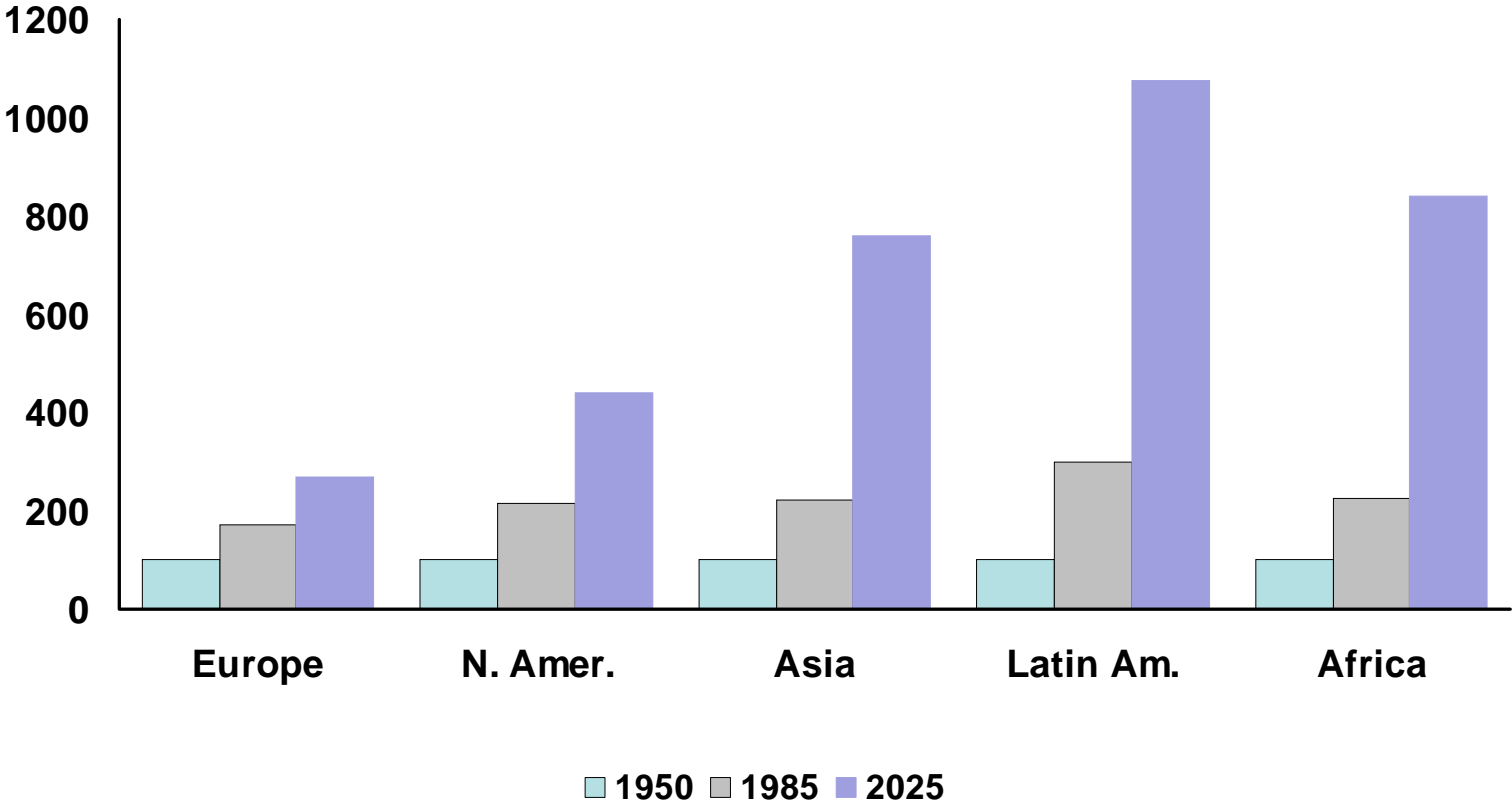


Age shifts in world population



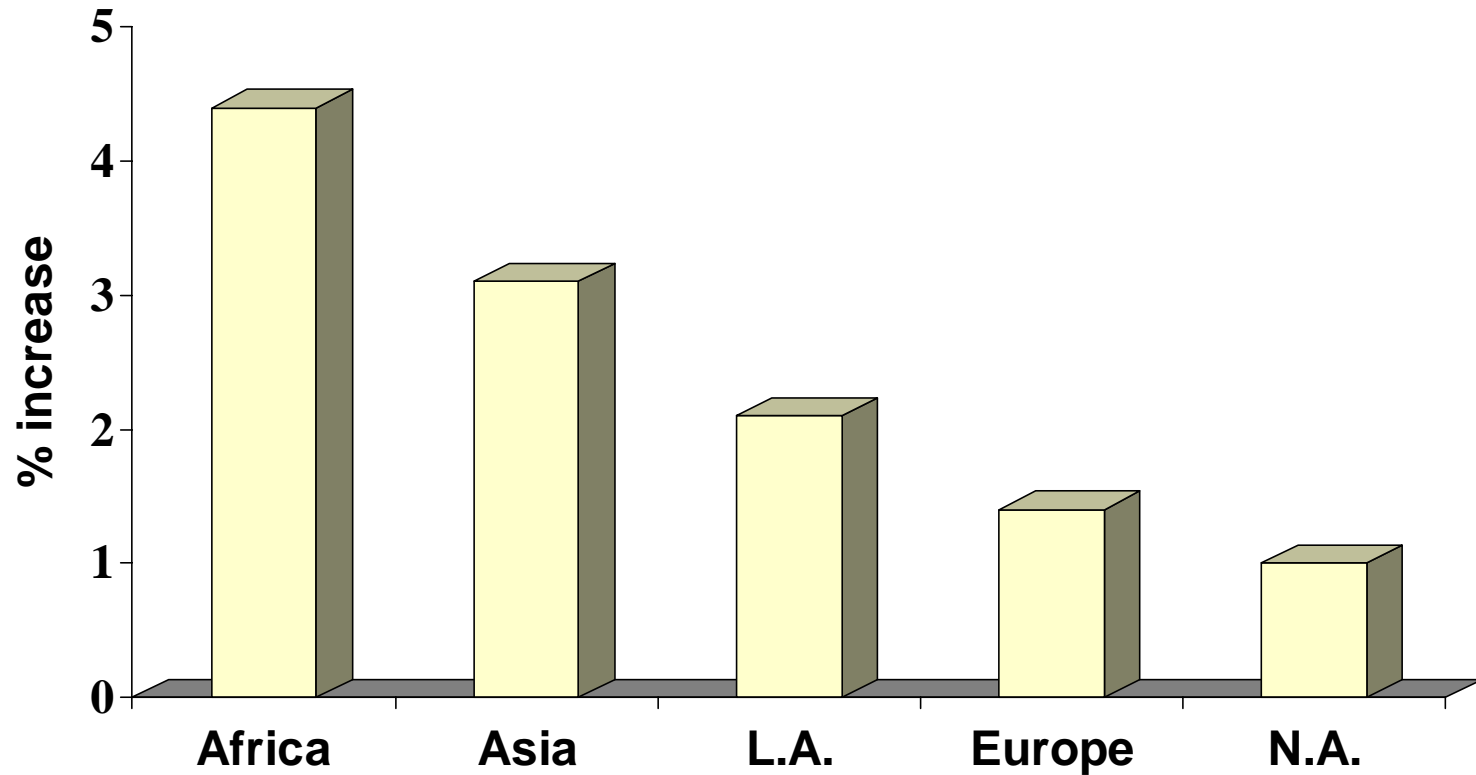
Population over 59 years

Relative increase, 1950 = 100

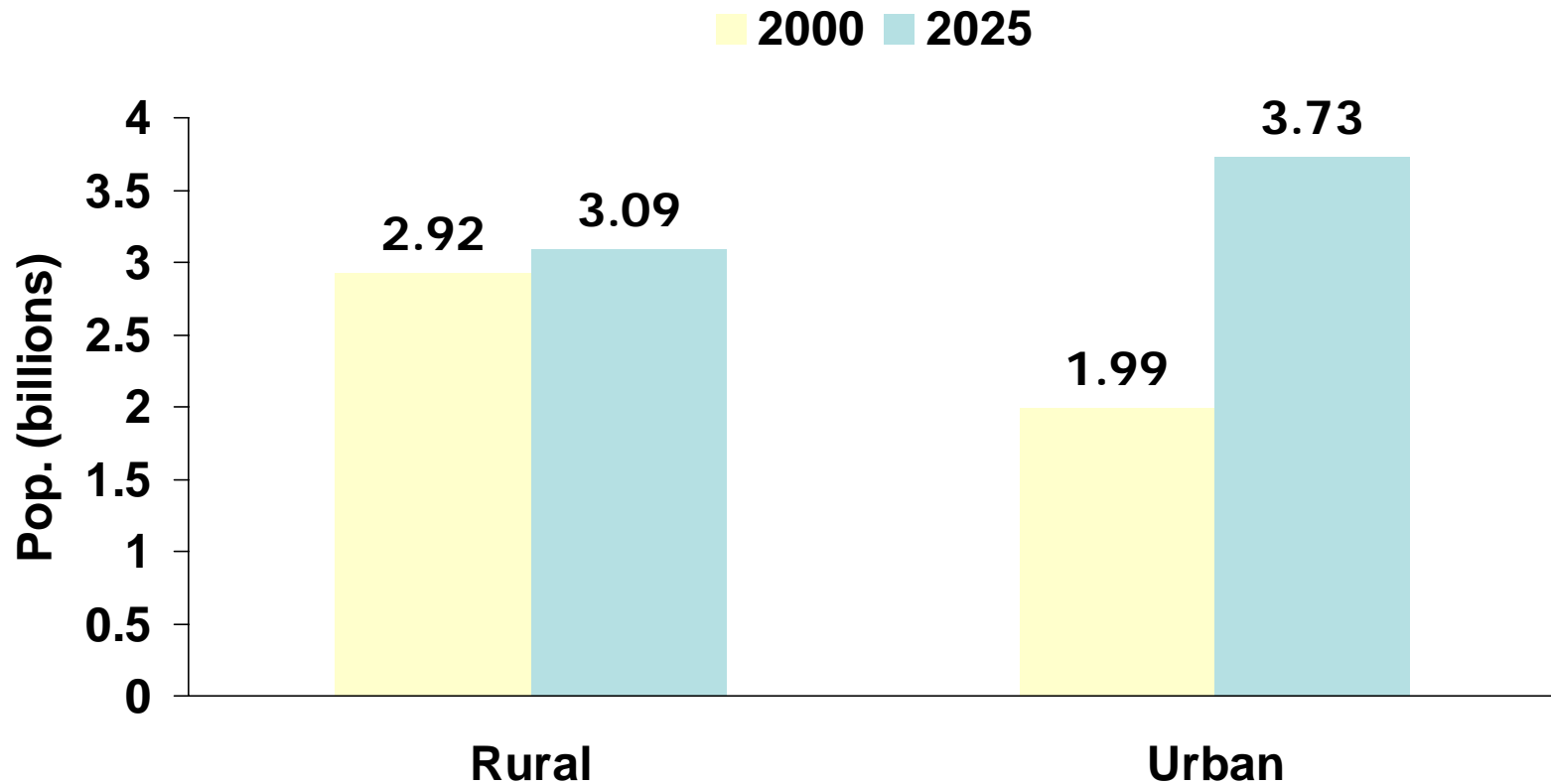


Urban growth

Annual increase, 1990-2000

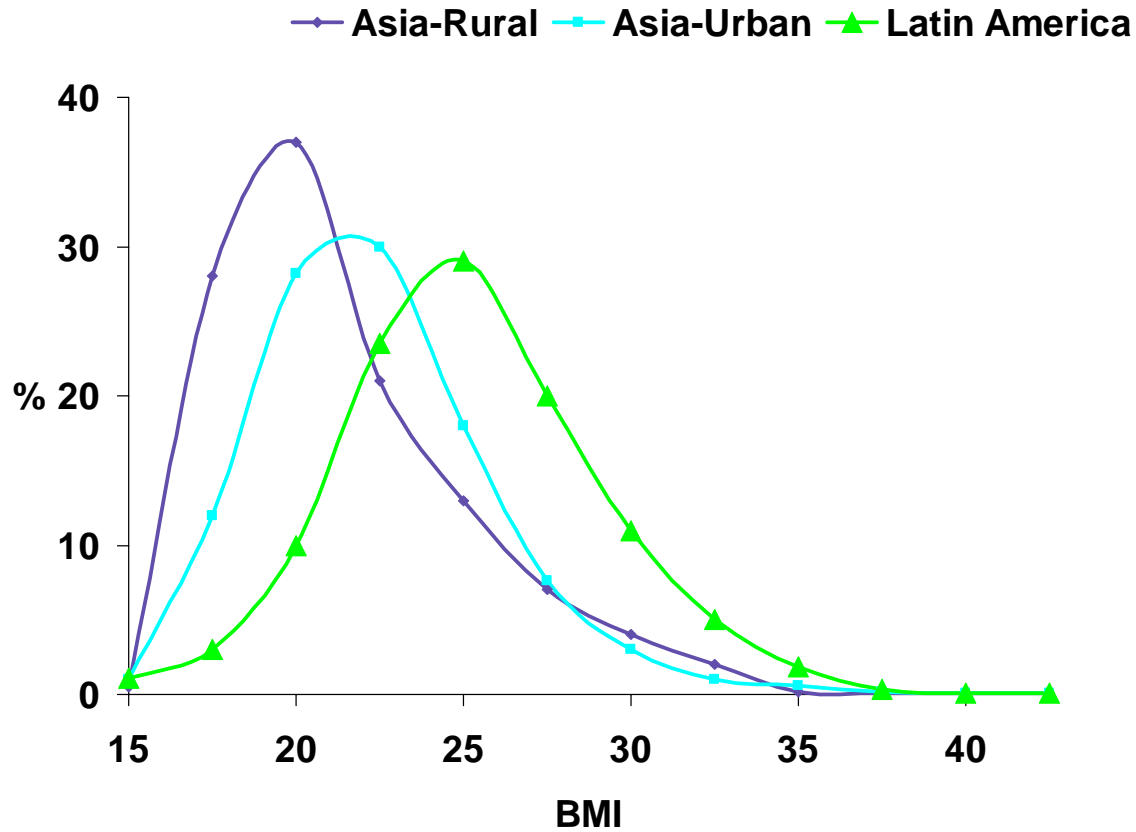


Projected population growth in the developing world, 2000 - 2025



United Nations, 1998

Urbanization and body mass index



GROWTH OF VENEZUELAN CHILDREN

Weight/age

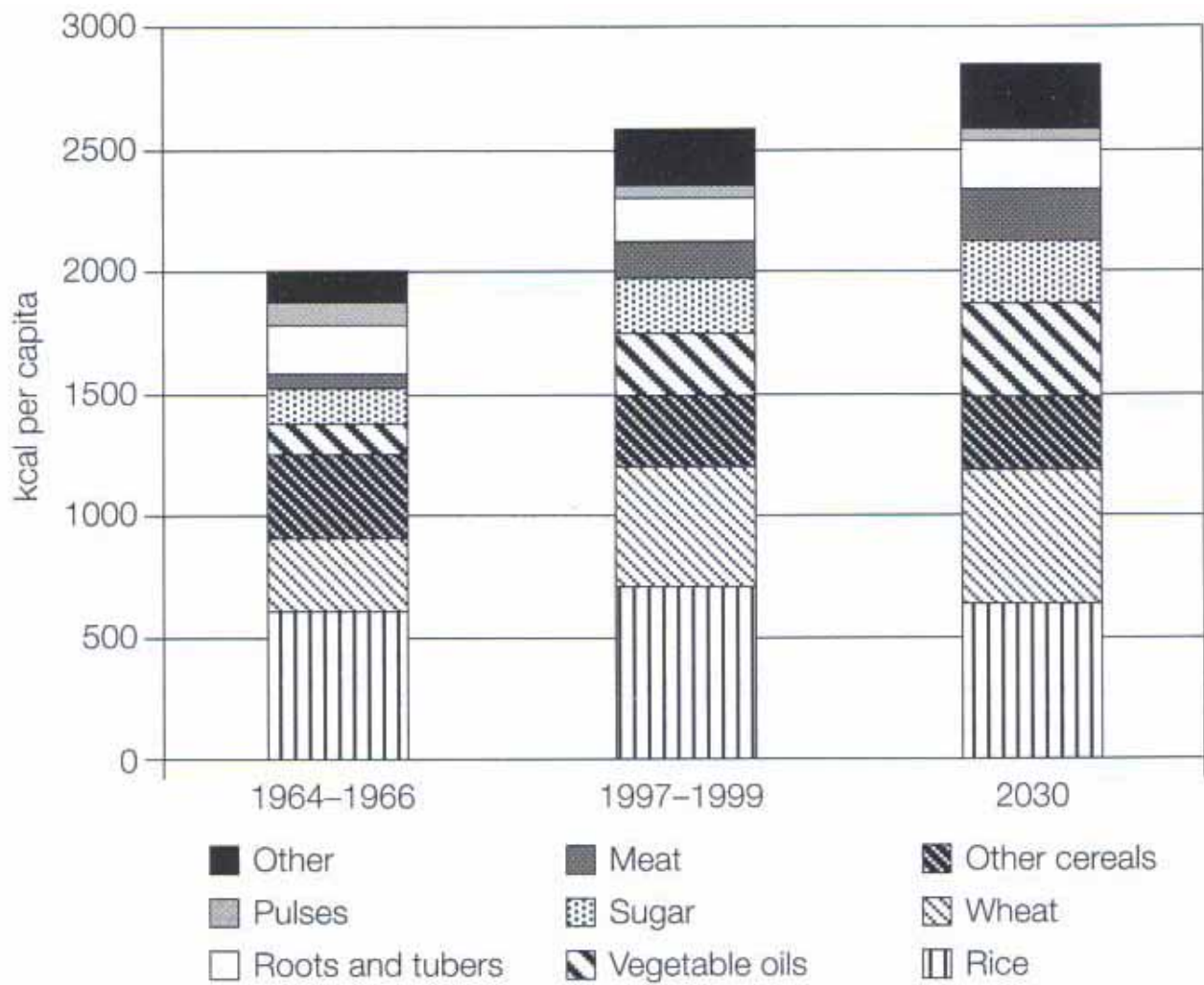
<i>Percentiles</i>	<i>Rural (%)</i>	<i>Urban (%)</i>
< 10th	27.69	17.99
10th > <90th	67.21	72.93
> 90th	5.09	9.06

Lopez Blanco et al, 1992

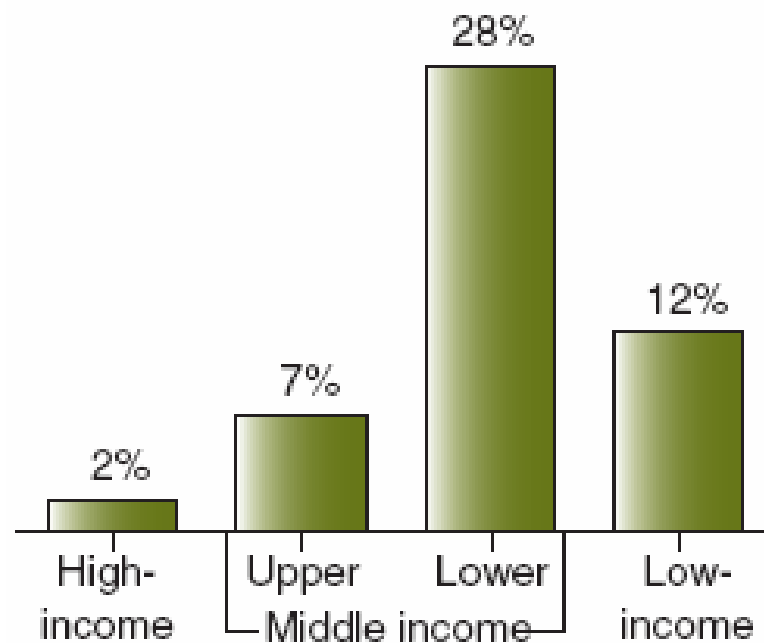
Dietary changes

- Changes in food type, availability and cost
- Changes in eating behaviors

Food commodities – Global trends

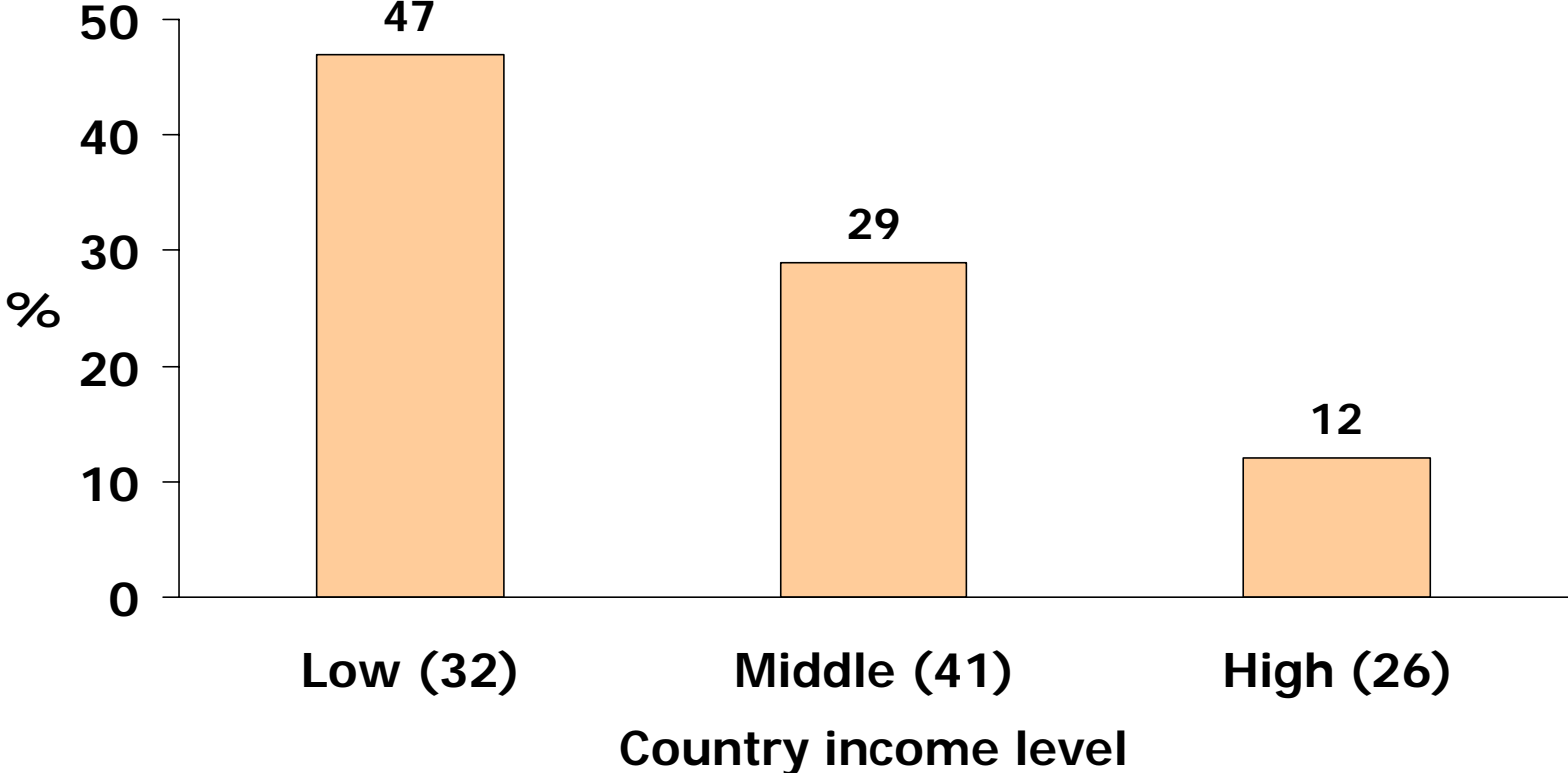


Growth in processed food market by GNI 1996-2002



USDA ERS-Euromonitor, 2003 – World Bank country classification

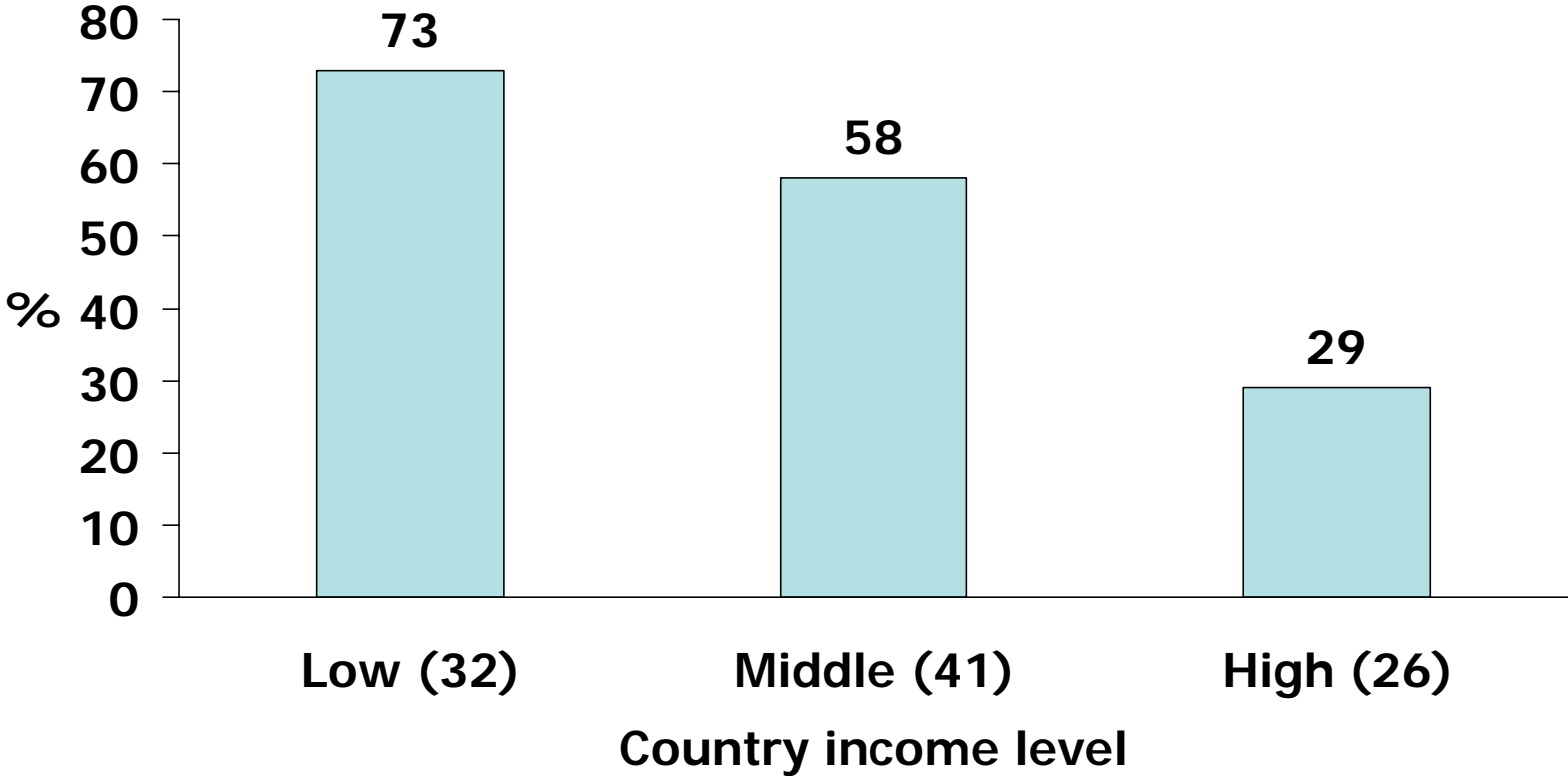
Food cost: household budget share



L=<15%, M=15-50%, H=>50% of U.S. median

USDA ERS WRS-01-1

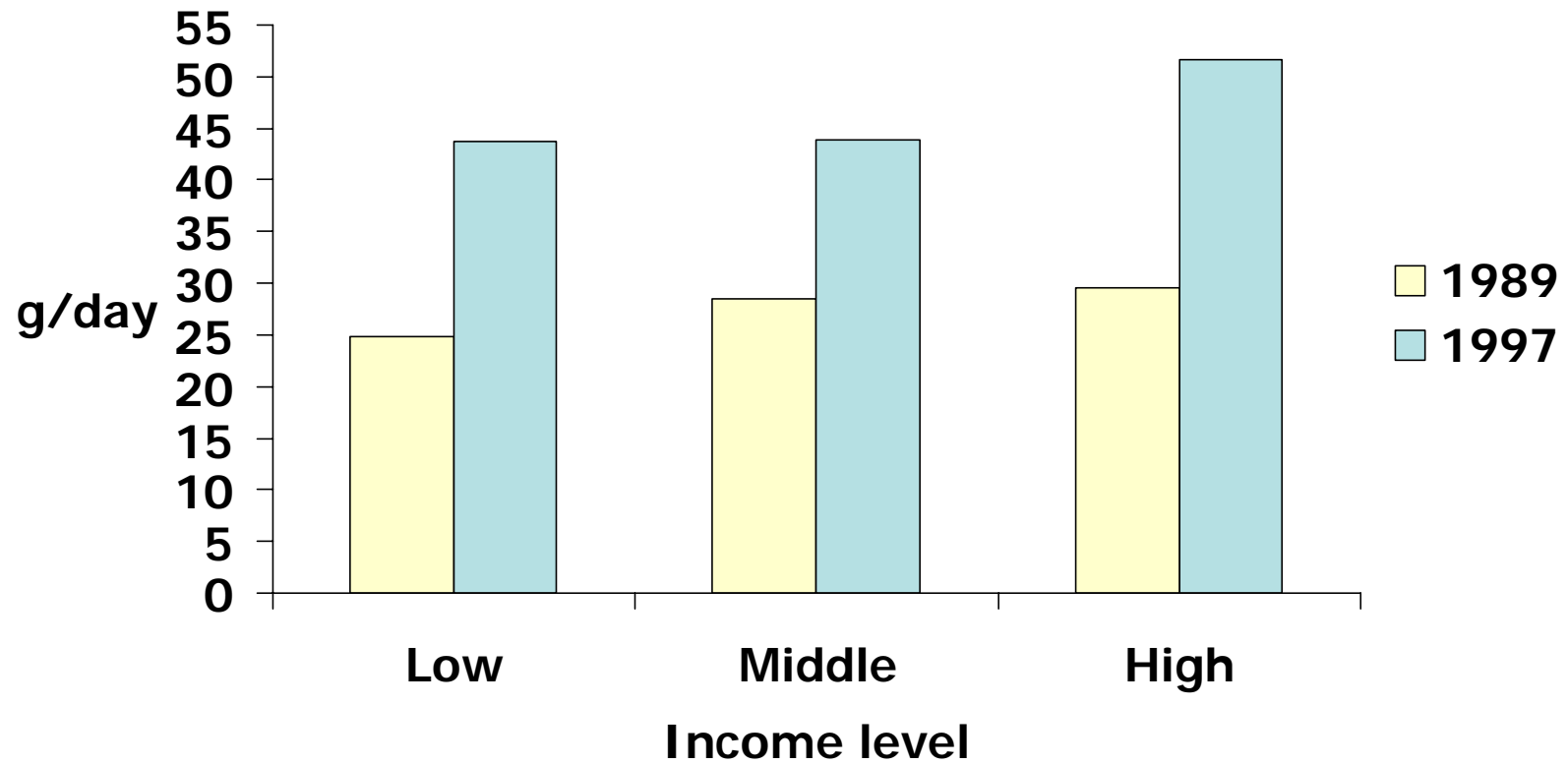
Food cost: income elasticity



L=<15%, M=15-50%, H=>50% of U.S. median

China: dietary trends

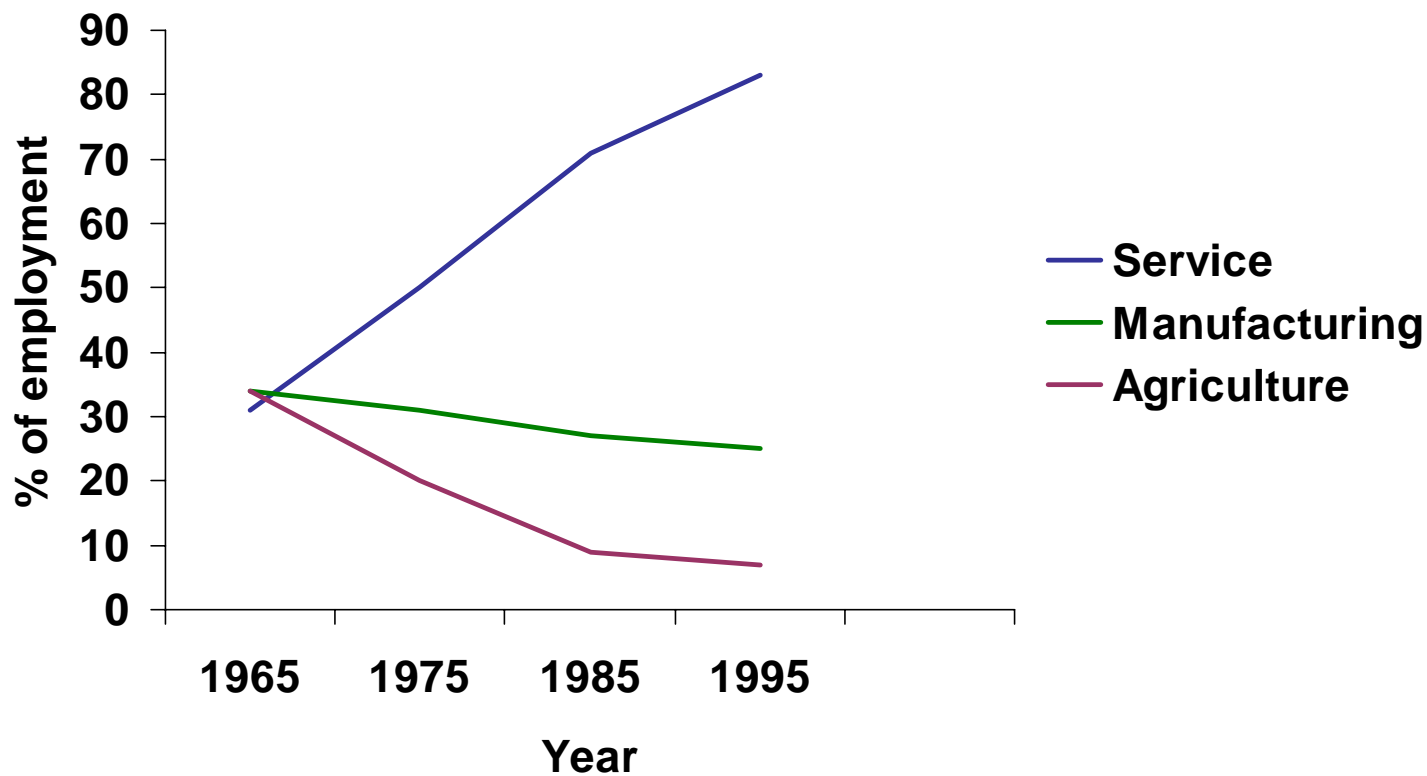
Consumption of edible oils



Lifestyle changes

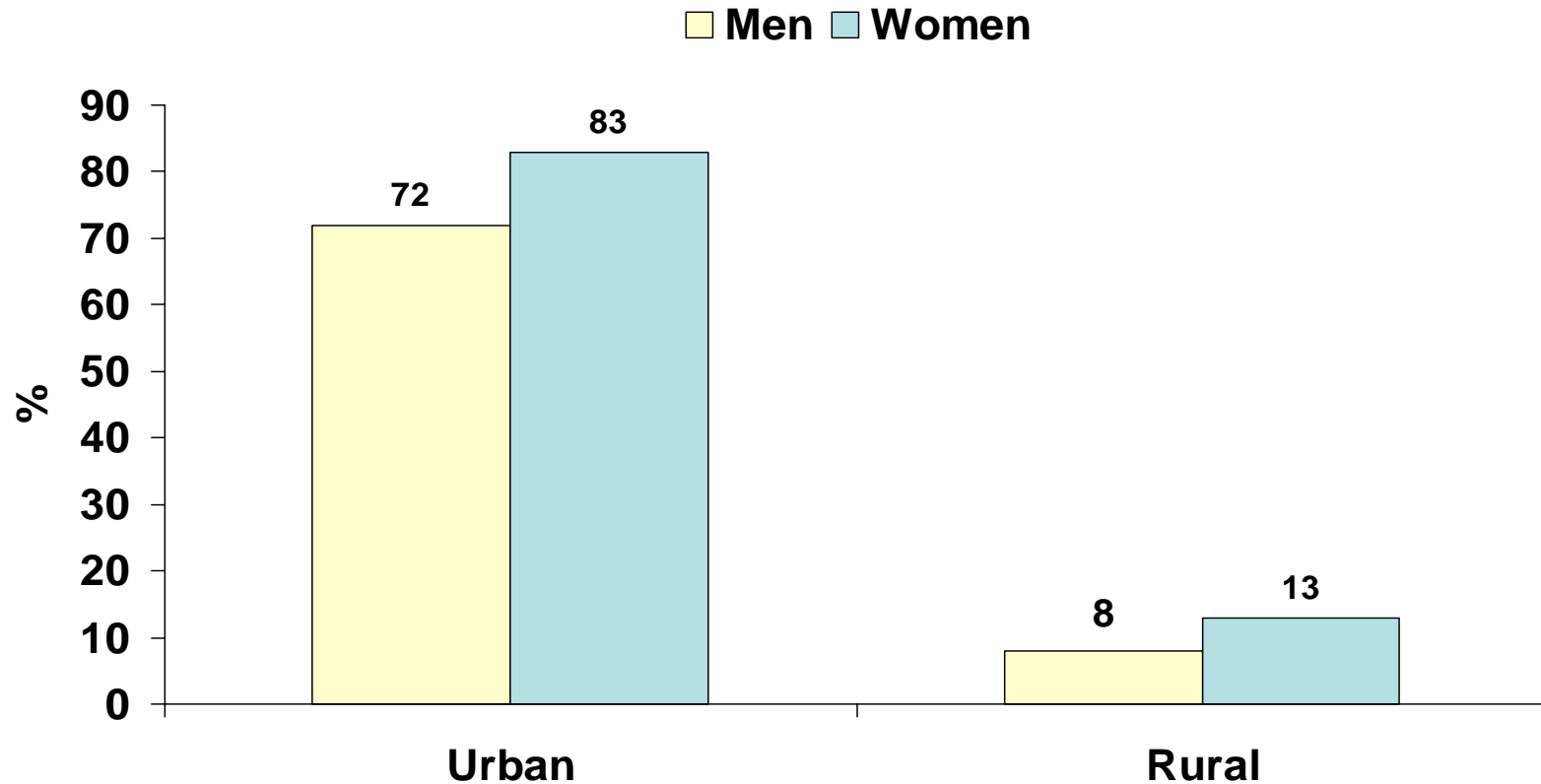
- ⊕ Reduction in energy demands at work
- ⊕ Reduction in energy demands of daily survival activities
- ⊕ Limited leisure physical activity
- ⊕ Television

Trends in employment type in South Asian transitional countries



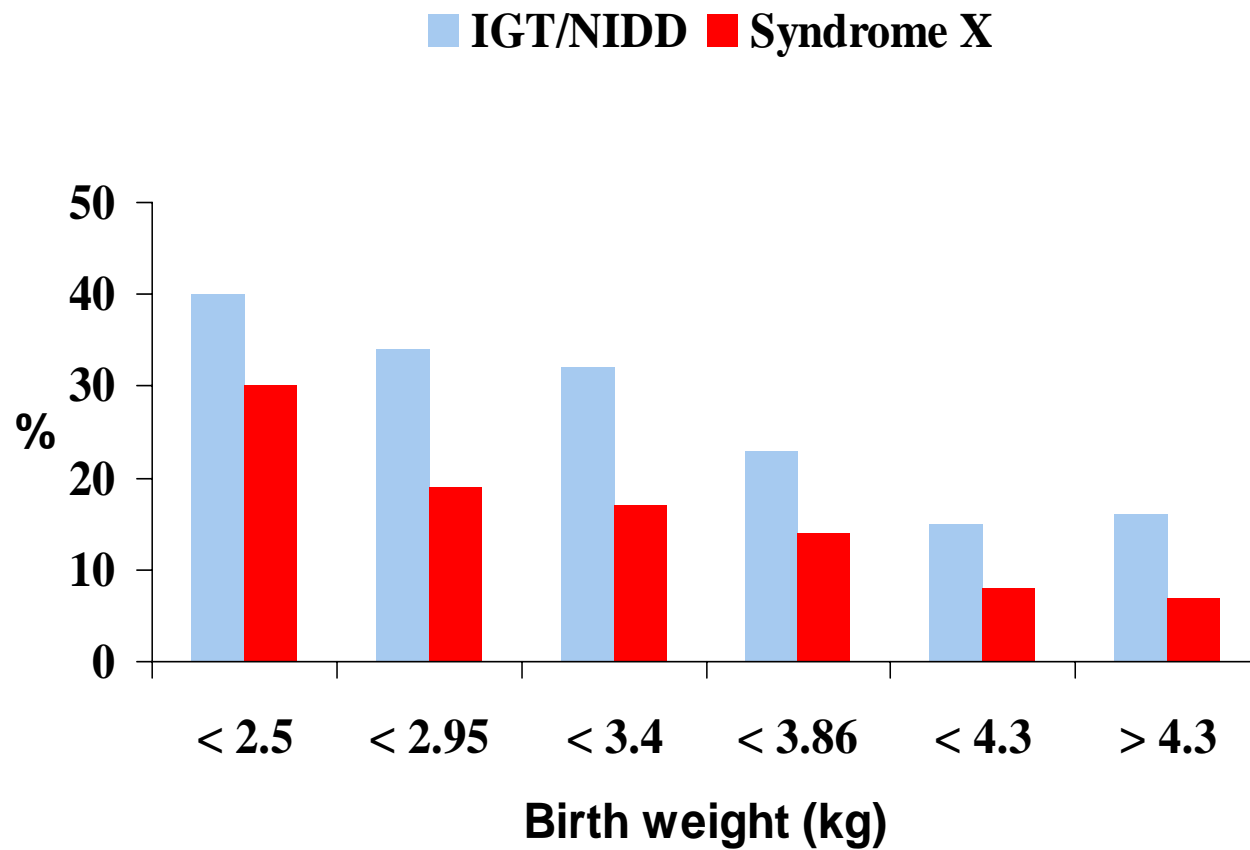
Popkin et al, 1998

The nutrition transition in China: Prevalence of sedentary occupational activity



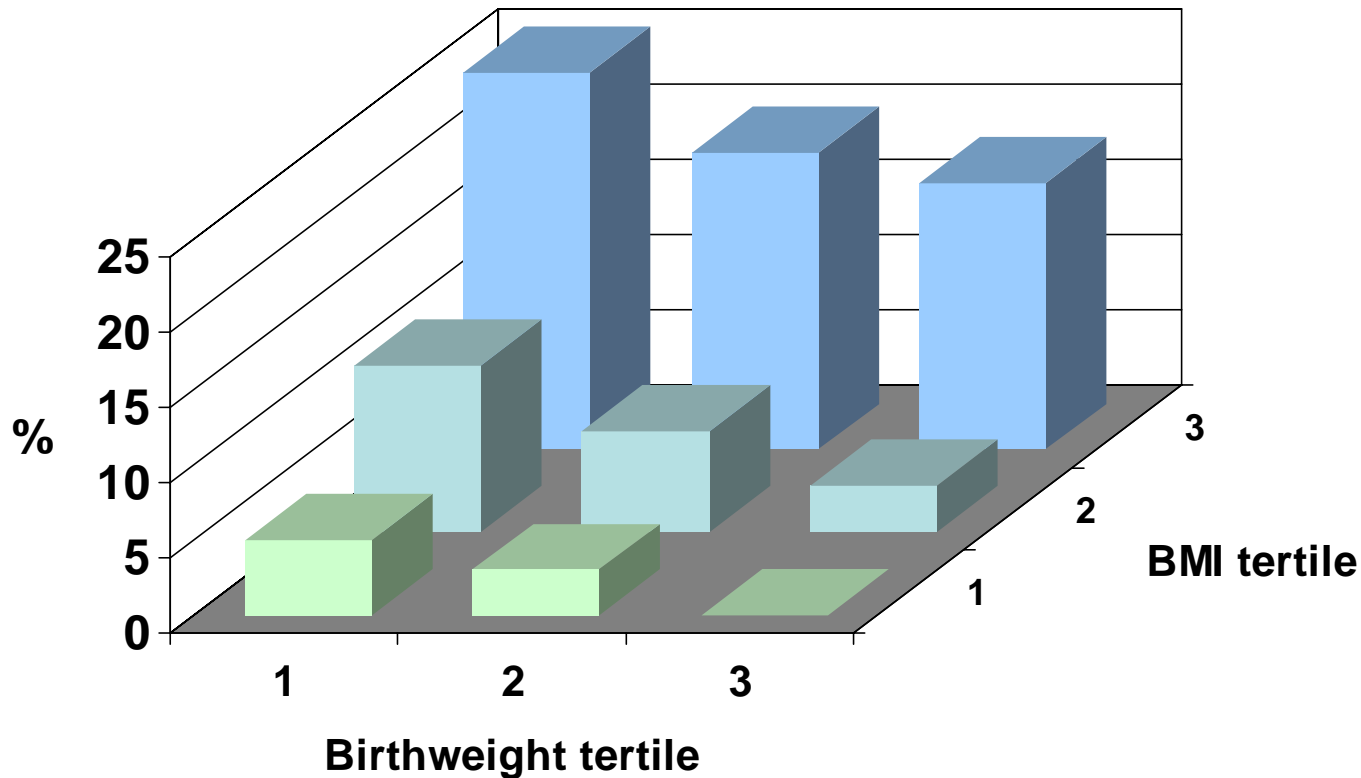
The added risk of early undernutrition

Birth weight and risk of diabetes and Syndrome X



Effects of birthweight and adult BMI on prevalence of the insulin resistance syndrome

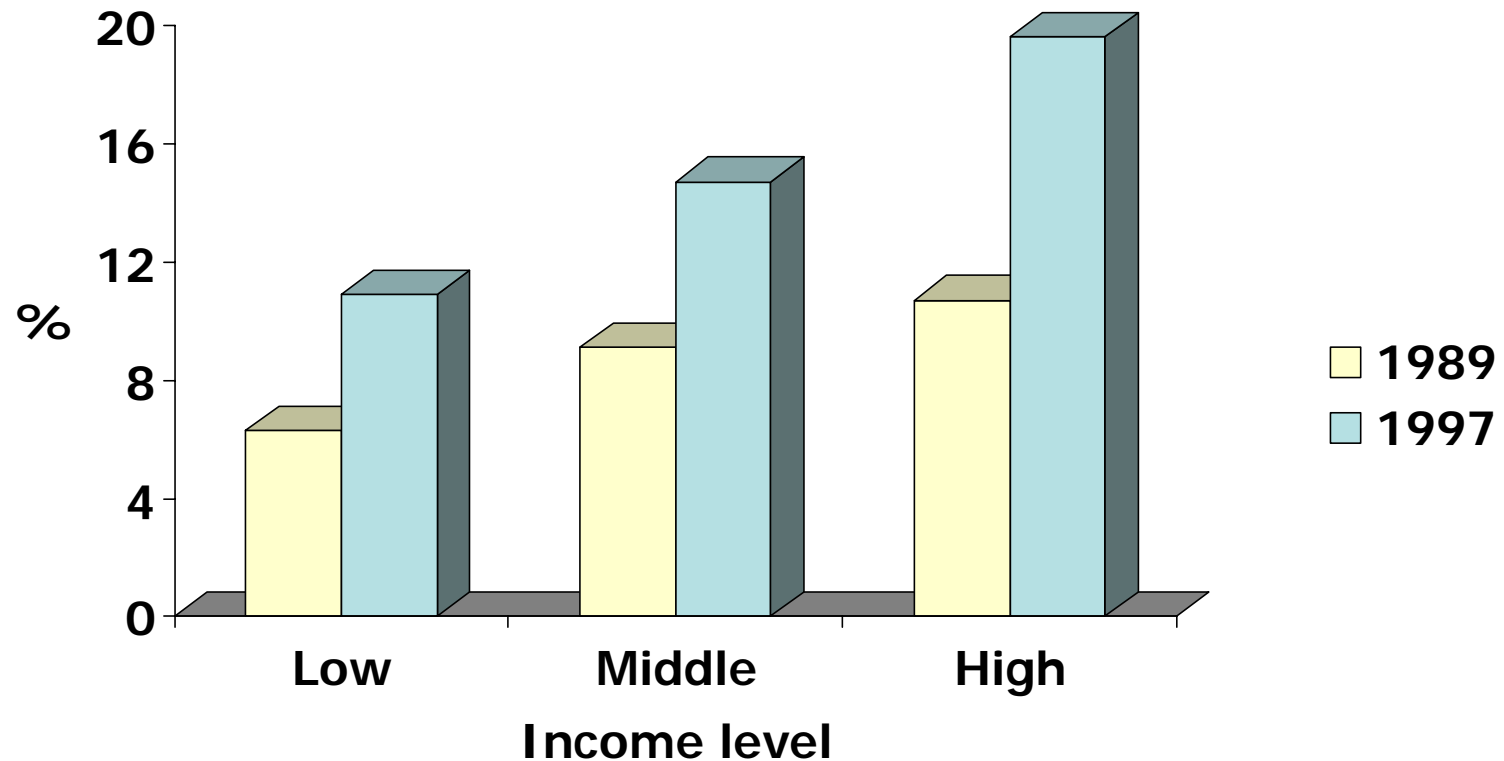
The San Antonio Heart Study



Valdez et al, Diabetologia, 1994

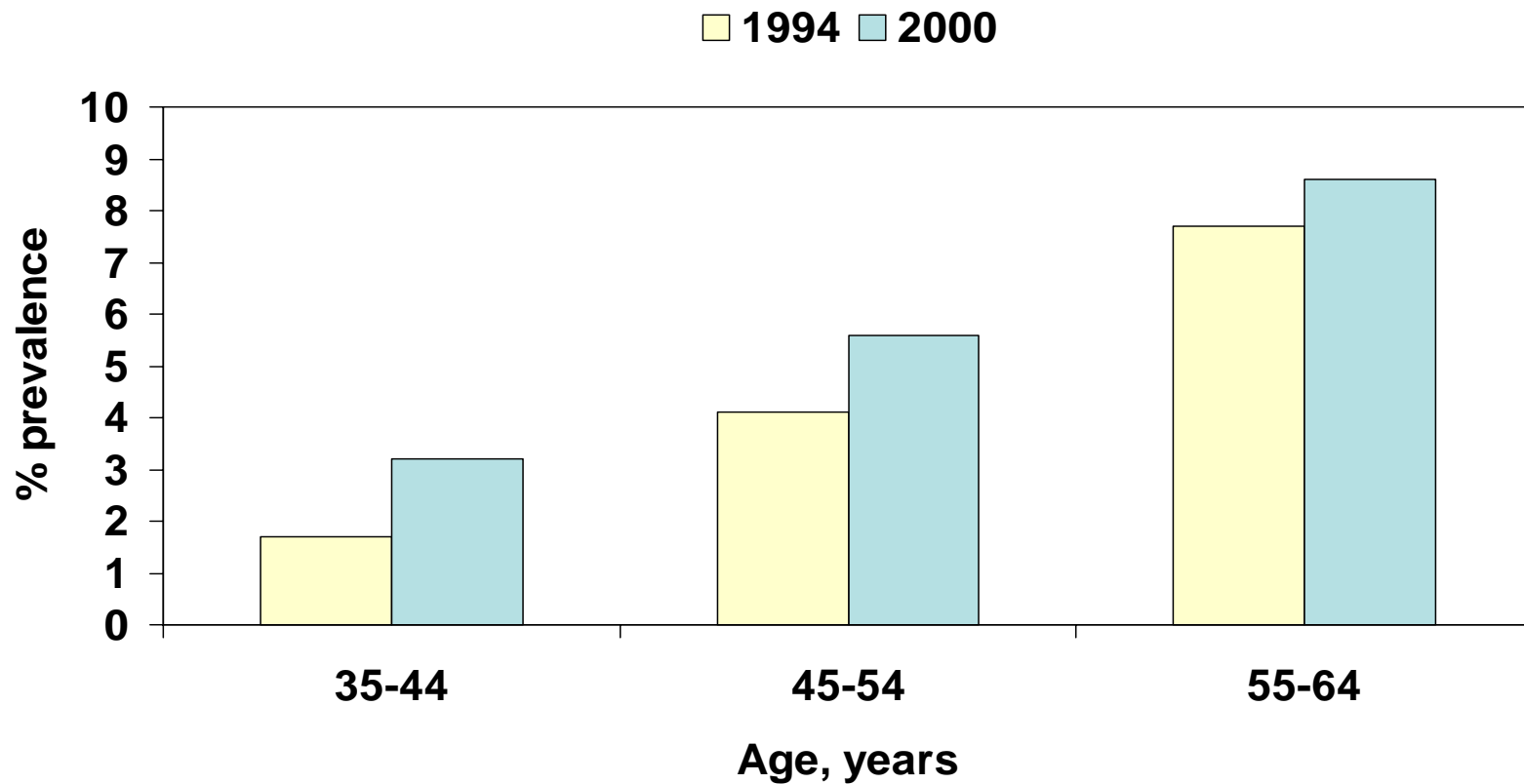
China: trends in obesity

Population with BMI > 25

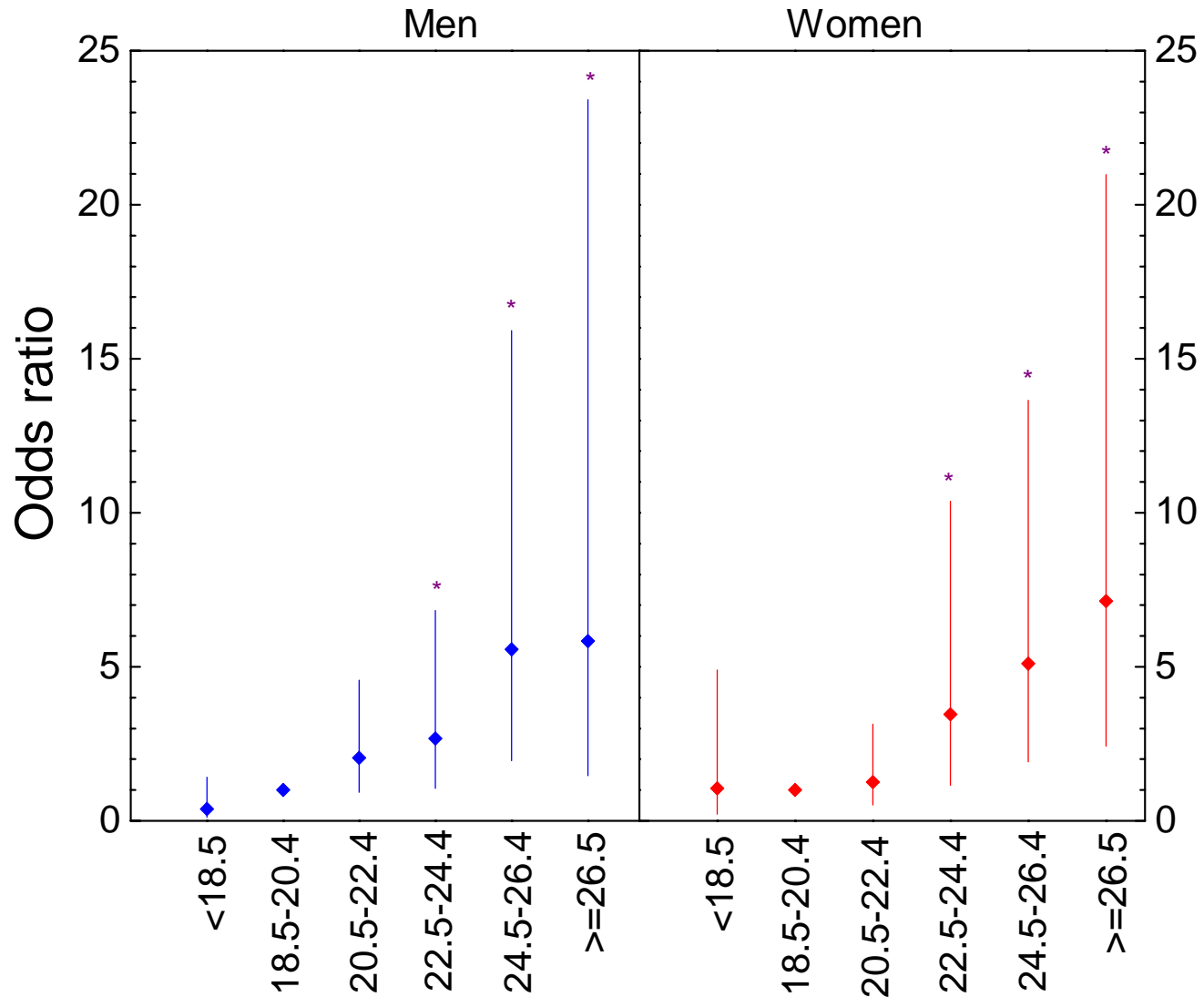


Trends in diabetes in China

Adults



China NTP: metabolic syndrome and BMI (urban and rural)



* Significantly higher than 1, $p < 0.05$

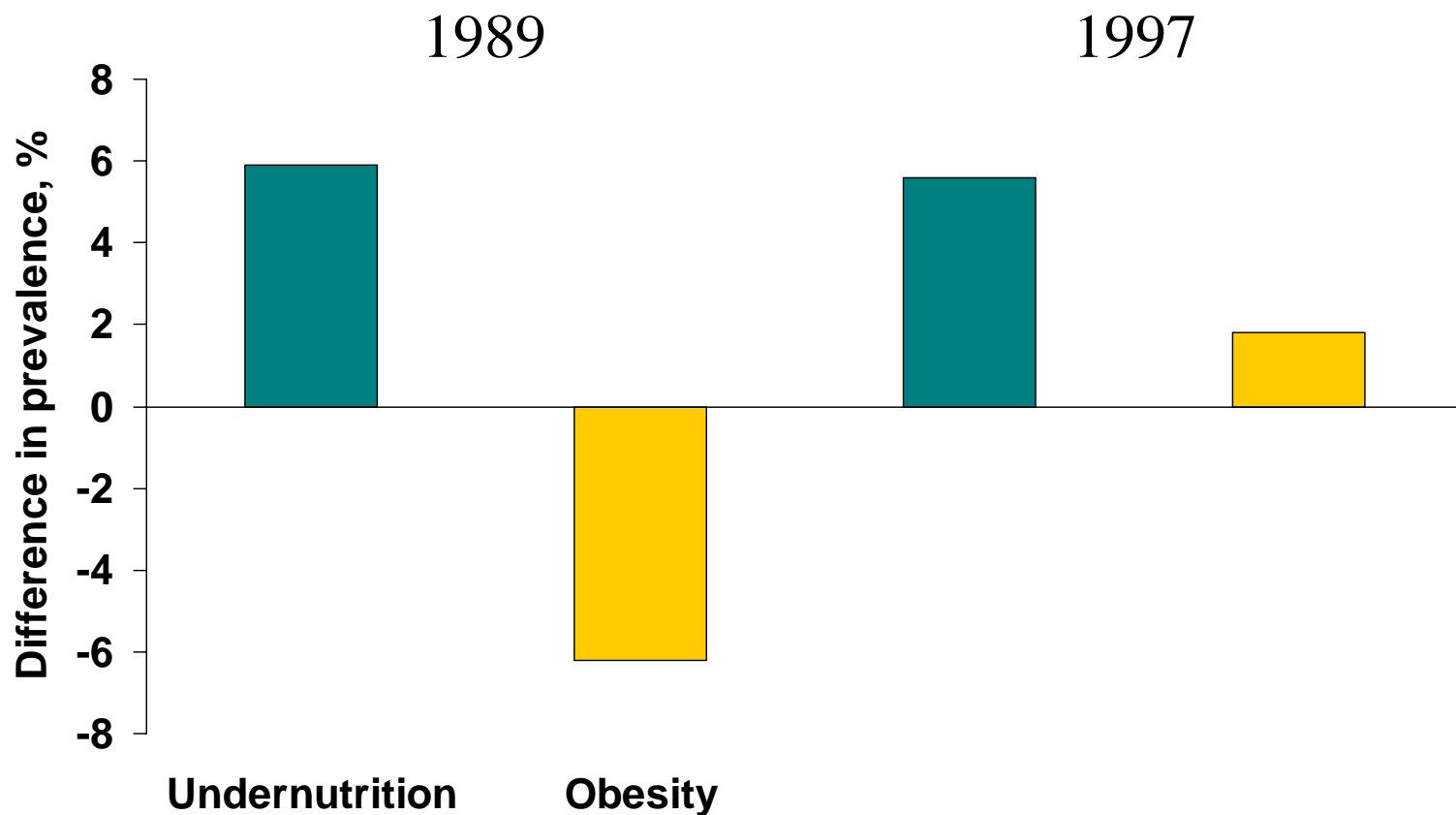
Age-adjusted urban-rural differences in lifestyle factors: Energy intake



Recent trends

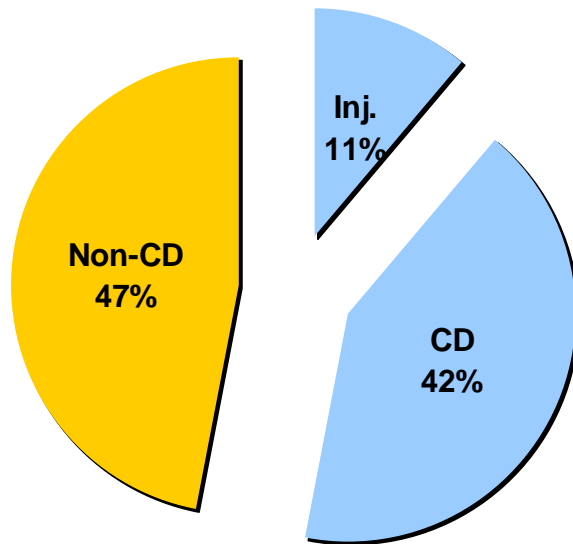
- ✿ In intermediate-income countries, obesity is increasing more among the poor
- ✿ Obesity prevalence in rural populations is approaching the rates of urban areas

Difference in prevalence of underweight and obesity, low vs. high SES - Brazil

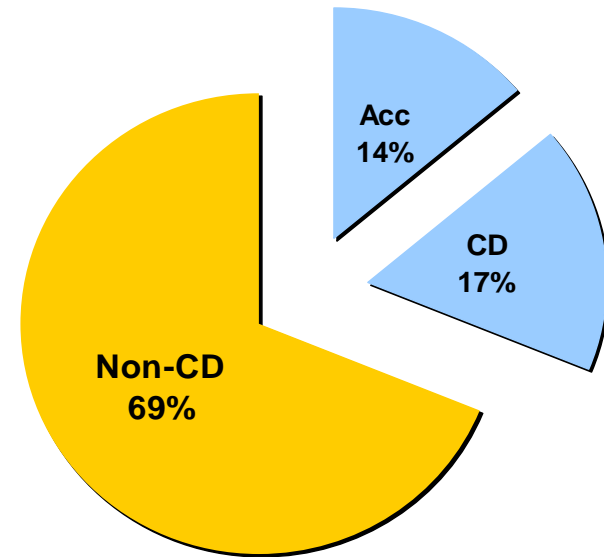


Disease burden in the developing world

1990

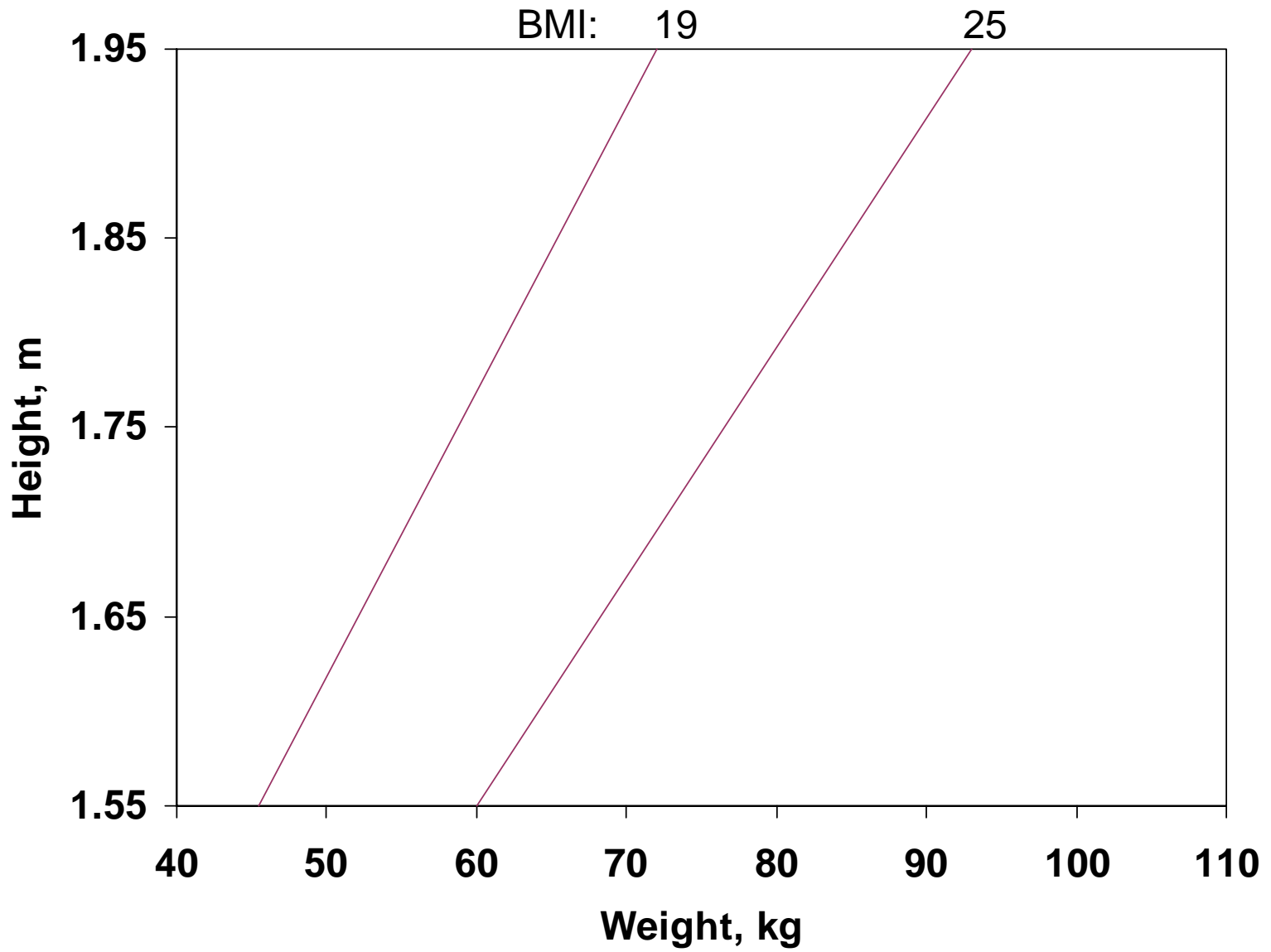


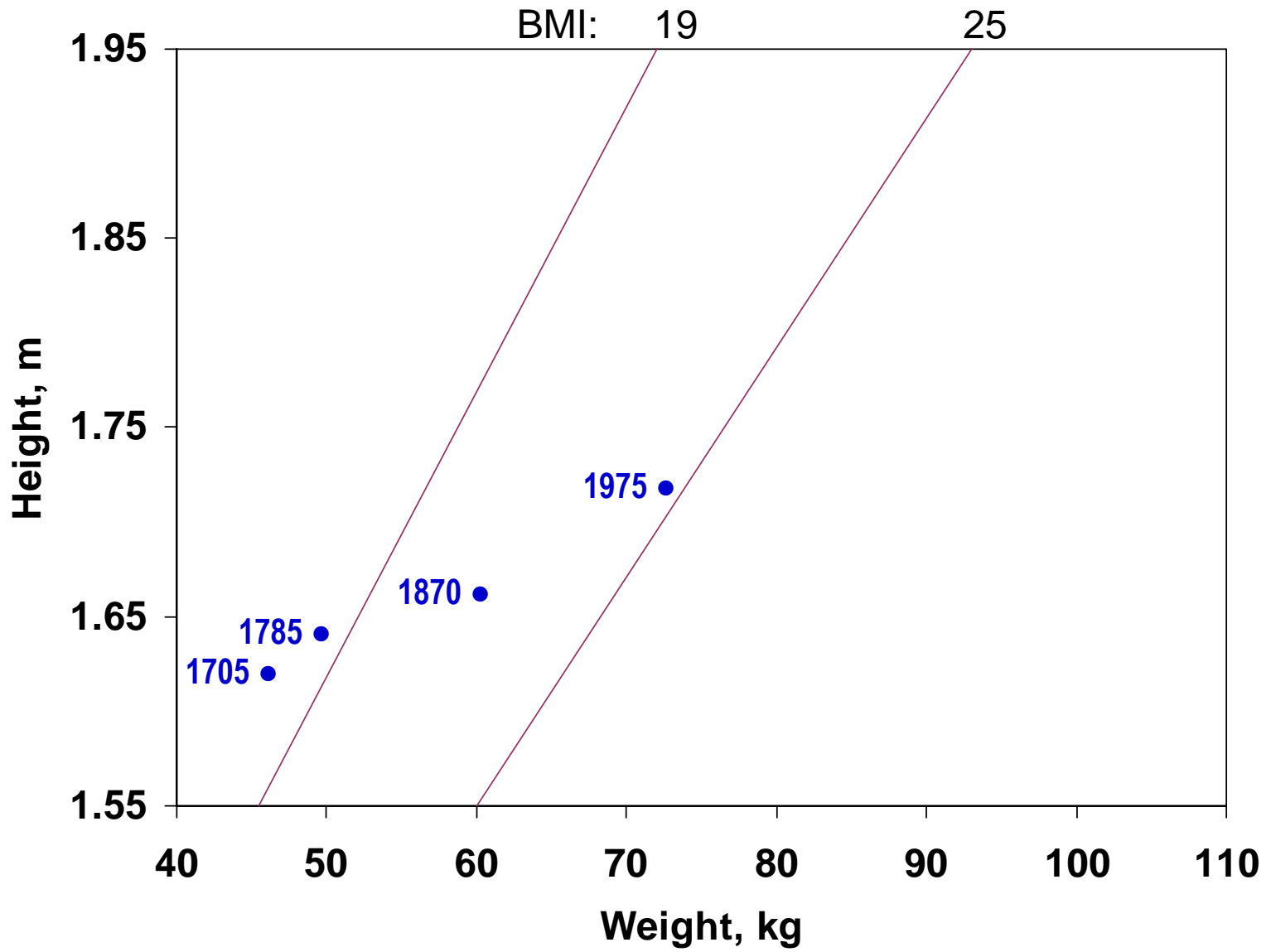
2020



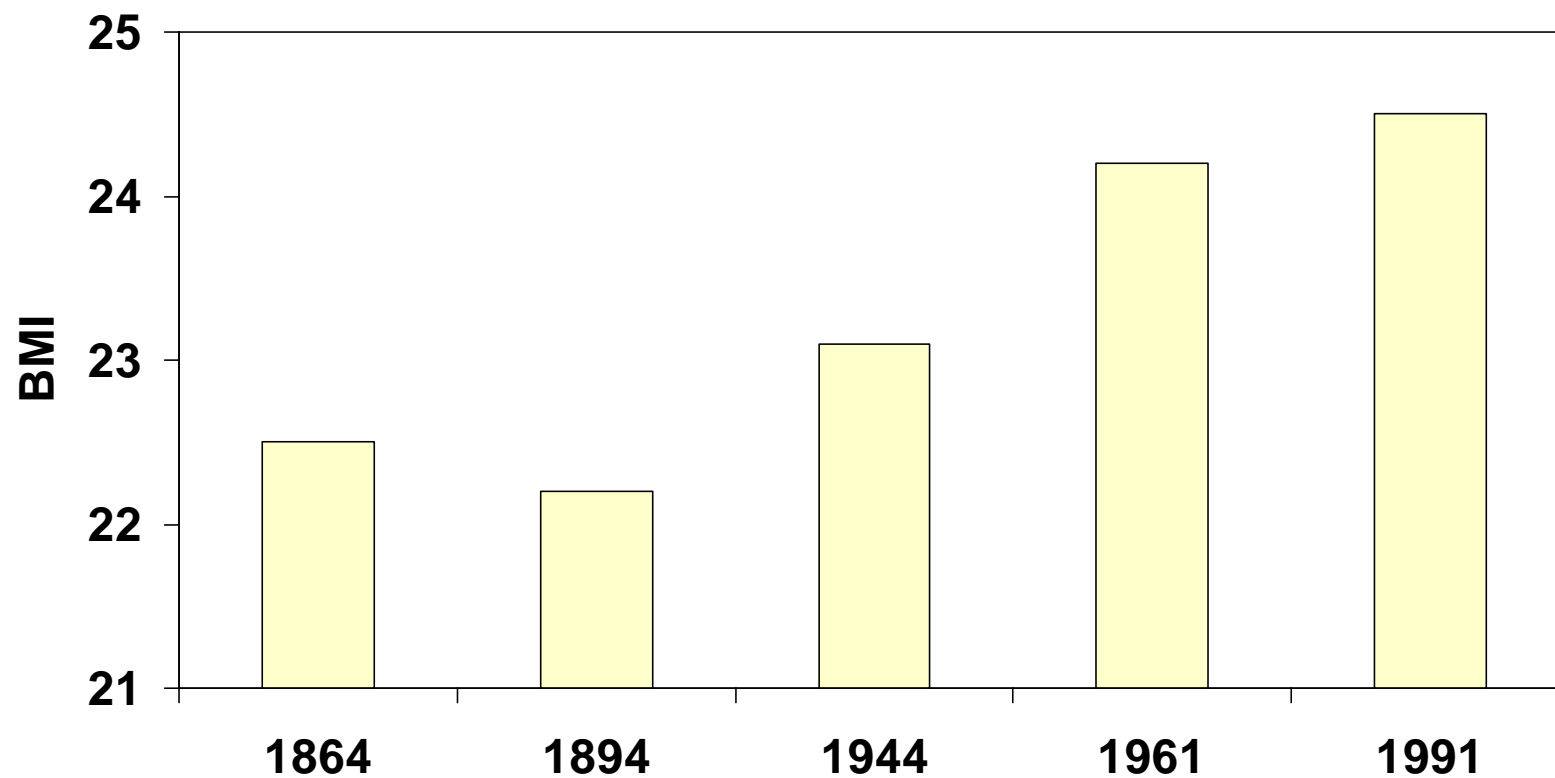
Murray & Lopez, 1996

The big picture





Mean BMI in 27 yr-old U.S. males

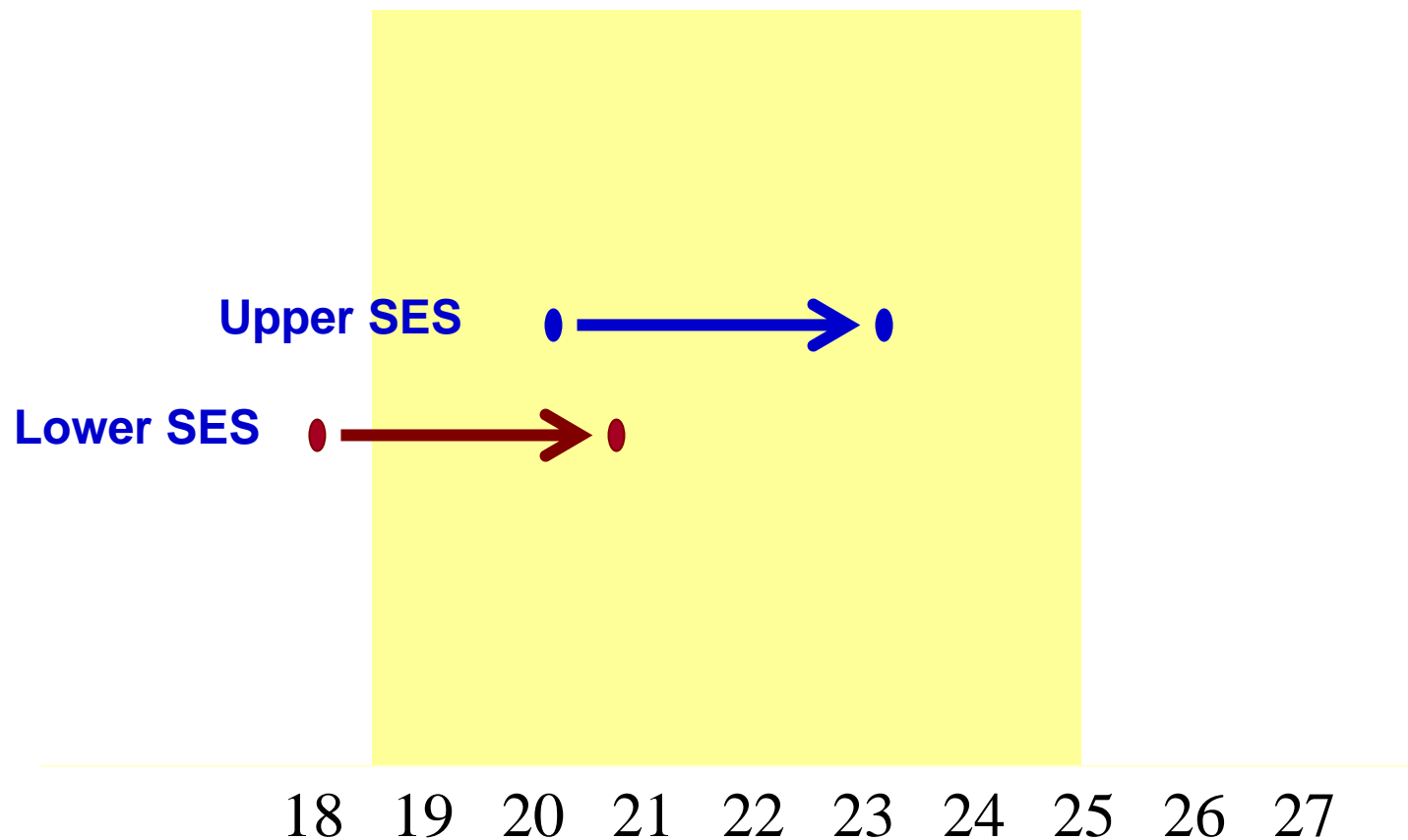


Costa & Fogel, 1997

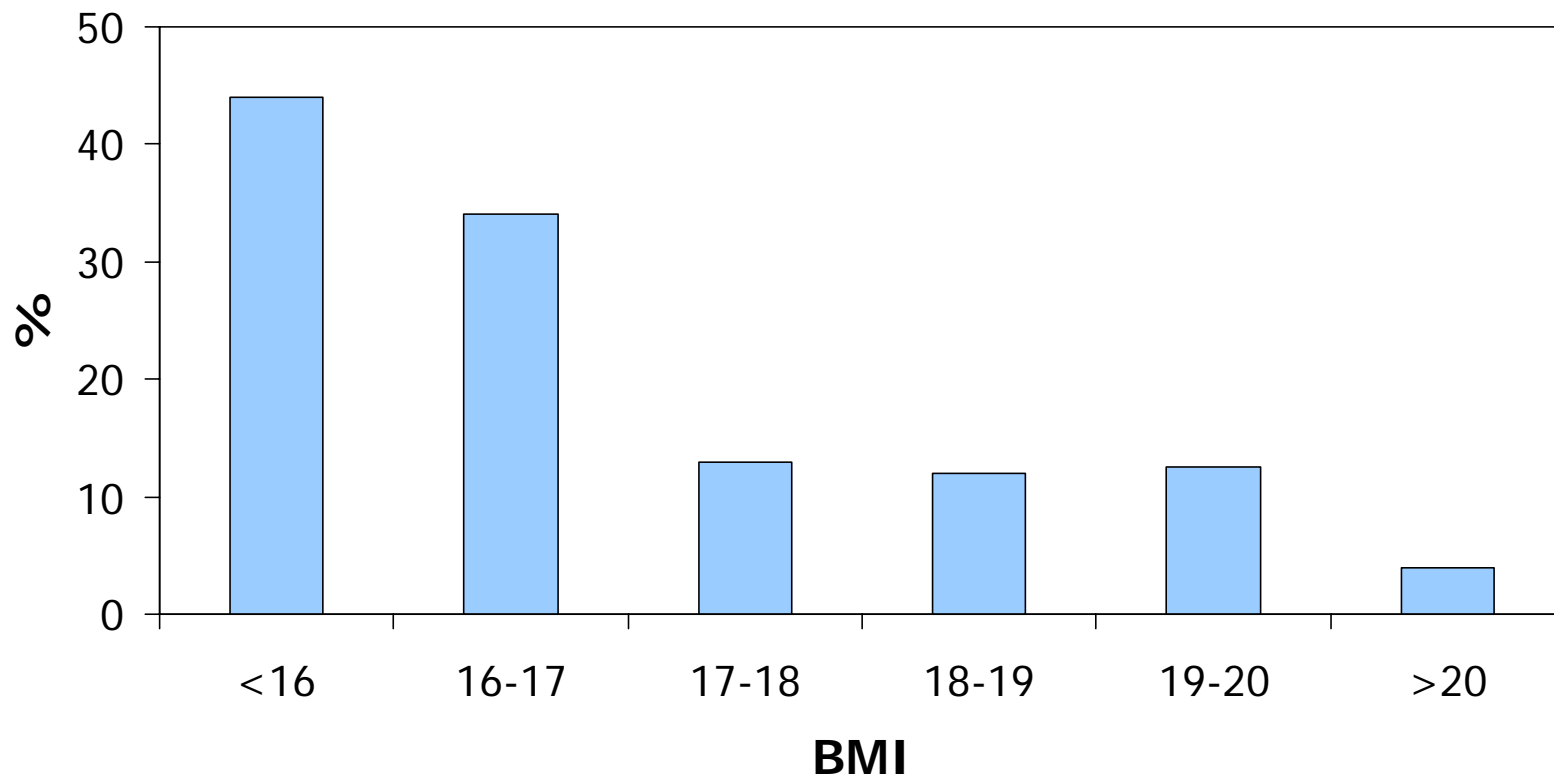
Trends in BMI in China

Modeling from regional and national data

1960 → 1990



% of men not working on the previous month due to illness (excluding accidents) - Bangladesh



Pryer, Eur J Clin Nutr, 1993

UN Millenium Development Goals

- ✚ Eradicate extreme poverty and hunger
- ✚ Achieve universal primary education
- ✚ Promote gender equality and empower women
- ✚ Reduce child mortality
- ✚ Improve maternal health
- ✚ Combat HIV/AIDS, malaria, and other diseases
- ✚ Ensure environmental sustainability
- ✚ Develop a global partnership for development